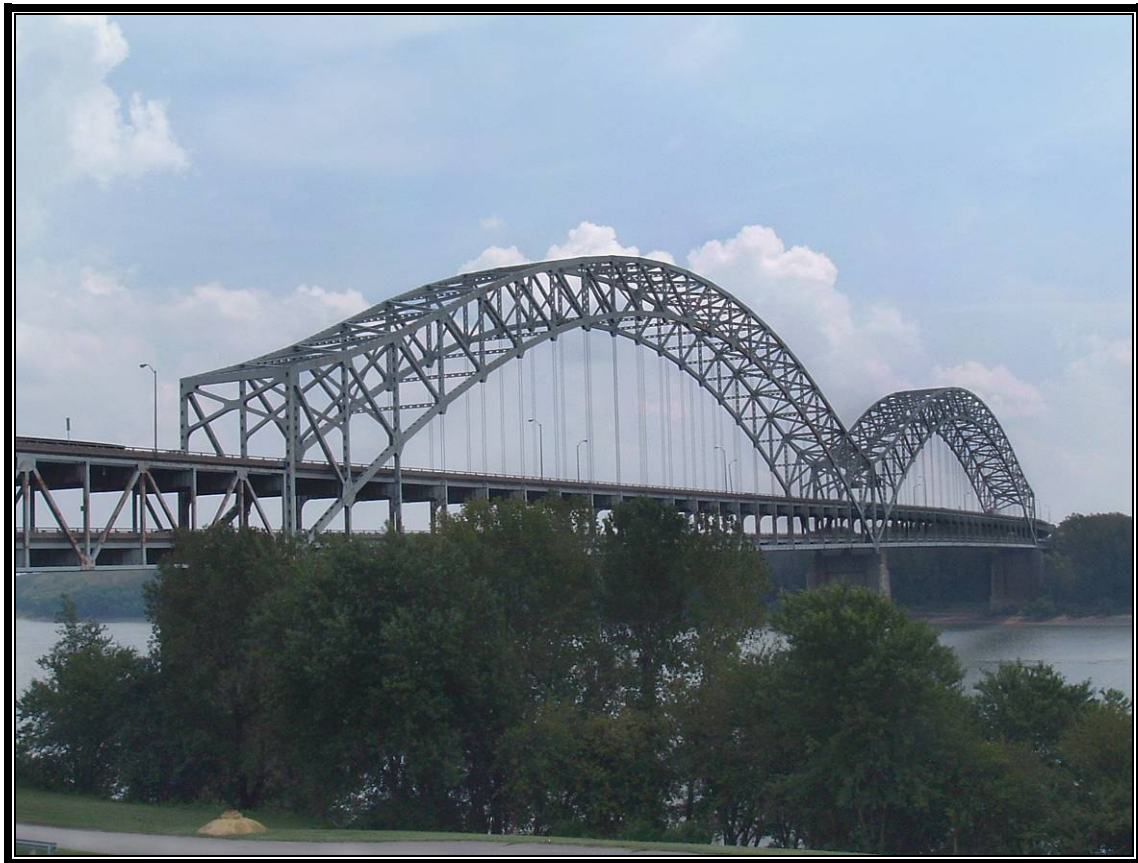


BRIDGE INSPECTION REPORT

SHERMAN MINTON BRIDGE I-64 OVER THE OHIO RIVER

AT NEW ALBANY, INDIANA
FLOYD COUNTY

BRIDGE NO. I-64-103-4961B



**STATE OF INDIANA
DEPARTMENT OF TRANSPORTATION**

NOVEMBER 2007



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PREPARED FOR:

STATE OF INDIANA

DEPARTMENT OF TRANSPORTATION
DIVISION OF ROADWAY MANAGEMENT
BRIDGE INSPECTION SECTION

NOVEMBER 2007

PREPARED BY:





SENIOR INSPECTING ENGINEER
URS CORPORATION

4/22/08
DATE

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- B. Documented Crack Indications
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- D. Fracture Critical Member Diagram - Main Truss Spans
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DISCLAIMER

This inspection report is based on data and conditions that are generally applicable as of November 2007 and the conclusions and recommendations herein are therefore applicable only to that timeframe. This inspection was not intended to be a complete arms-length inspection, therefore findings and conclusions in this report are limited to specific areas of the bridge as defined in the scope of work. This report should not be used as the sole basis for the preparation of rehabilitation or repair plans, construction or remedial action, or as a basis for major capital decisions.

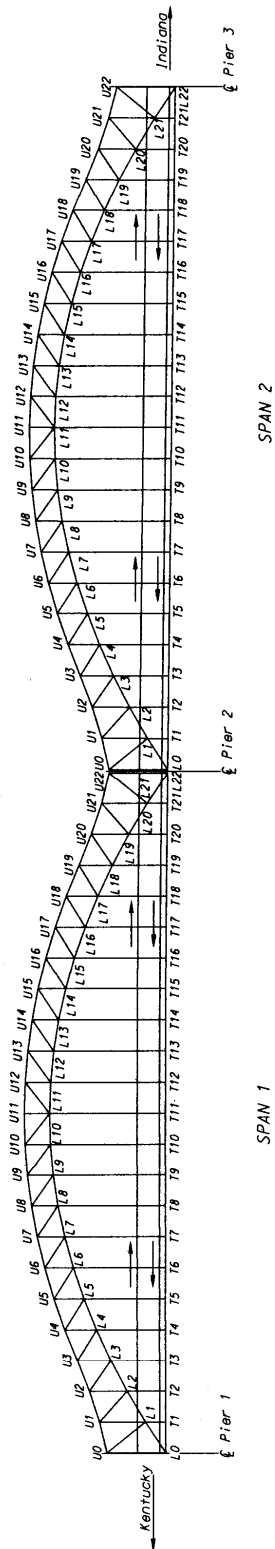
STATE OF INDIANA



BRIDGE SITE



GENERAL LAYOUT



1.0 INTRODUCTION

1.1 GENERAL

In accordance with an agreement with the Indiana Department of Transportation, URS Corporation (URS) inspected the physical condition of the I-64 Sherman Minton Bridge over the Ohio River. The level of inspection was an assessment of the fracture critical lower tie chords and truss arch members of the two tied arch spans. This was not intended to be a complete arms-length inspection. The scope of the inspection is provided below.

Palmer Engineering was subcontracted to assist in the structural inspection and report writing.

Intech Contracting, Inc. was subcontracted to provide inspection access equipment, traffic control and other services needed to complete this project.

Derby City Engineering and Inspection (DCEI) was subcontracted to provide non-destructive testing services.

This *Bridge Inspection Report*, prepared by the URS-Palmer Engineering Team, adheres to the *Scope of Work* prepared by the Indiana Department of Transportation. This report includes all findings discovered in the field inspection.

1.2 BRIDGE DESCRIPTION

The Sherman Minton Bridge carries I-64 over the Ohio River between New Albany, Indiana and Louisville, Kentucky. The bridge, designed by Hazelet + Erdal, Inc. (now URS Corporation), consists primarily of two 800'-0" simple tied arch trusses (Spans 1 and 2). In each tied arch span, rigid floorbeam frames made of welded and bolted high strength steel components support the double roadway decks. The frames are either supported from the arch rib by vertical truss members or by 2½" diameter suspender cables. The floorbeams, supported completely by the arch rib, are attached to the lower tie chord for bracing only.

The Indiana Approach (Spans A thru C) consists of a three-span continuous deck through truss and numerous multi-girder spans as the roadway transitions from a double deck to a side-by-side alignment. The total length of the Indiana Approach is 450'-0".

Panel points and spans on the Sherman Minton Bridge are numbered from east to west along I-64 (see Figure 1). The upstream side of the bridge (towards downtown Louisville) is considered north, and the downstream side is south.

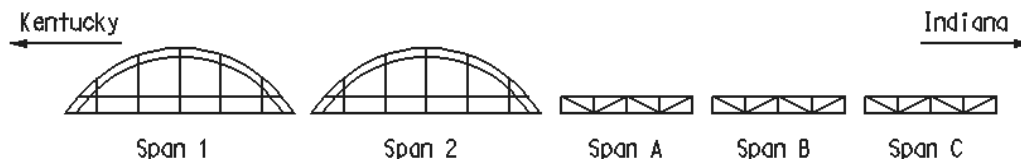


Figure 1: Sherman Minton Bridge Span Designations

1.3 SCOPE OF INSPECTION

This inspection was not intended to be a complete arms-length inspection of the entire bridge. The descriptions listed below illustrate the outline provided in the *Scope of Work*.

Tie Chords

A detailed, up close visual inspection of all welded details and previously repaired areas on all four tie chords was performed without the use of specialized equipment. Inspectors used climbing techniques to access the tie chords. The lower 6" on the exterior side plates and the bottom of the bottom plates were inaccessible.

Non-destructive testing consisting of magnetic particle testing and ultrasonic testing was performed at the majority of previously known defects and/or repaired areas in the butt welds. This testing included all previously detected indications which are longitudinal to the butt welds.

Truss Arches

An up close visual inspection was performed on the fracture critical and stress reversal members in the truss arches accessible with a 135' lift. The inspection included the cables and the top cable assemblies. A cursory inspection of the bottom cable assemblies was performed from the deck.

Miscellaneous

A cursory inspection was performed on the floorbeams, stringers, diaphragms, bearings, abutments, piers, and Indiana Approach girders.

Time allowed inspection of two specific areas outside the scope for this project:

- Portion of the steel cross girders (pier caps) located in the Indiana Approach (Spans D-M).
- Verification of the condition of a crack in a vertical truss member at L5 in Span A.

1.4 REPORTING PROCEDURE

The procedure and format for reporting the condition of this structure conforms to the *Scope of Work* and instructions provided by the Bridge Inspection Section of the Office of Technical Services.

The bridge condition, shown in Appendix A, provides the applicable structural member number from the Indiana Department of Transportation State Form 25801, "Bridge Inspection Field Report." Paralleling State Form 25801 provides a reference to the standardized form and corresponds with previous INDOT inspection procedures. For the components which were given a cursory inspection, condition descriptions are provided for deficiencies noted during a brief evaluation. These descriptions do not represent the condition of all the components and should not be used to rate the structural condition of the bridge.

Tables showing the history of the documented crack indications for the butt welds, lug welds and lateral connection plate welds have been included in Appendix B. For the 2007 inspection, four

digit numbers have been assigned to the butt weld and lug weld indications. It is the intention to write these numbers on the bridge adjacent to each indication during the next inspection.

For crack indications found on the butt welds, the first digit designates the tie and span, and the remaining three digits designate the specific indication.

For the lug welds, the first digit designates the tie and span, the middle digits designate the diaphragm number starting from the east end of each tie, and the last digit designates the lug position on the diaphragm. Every lug in the tie chords has a reserved number. The tables in Appendix B show only the lugs with known defects or indications.

Table 1: Crack Indication Naming Convention

| Indication Group | Section of Bridge |
|------------------|-------------------|
| 1000's | Span 1, South Tie |
| 2000's | Span 2, South Tie |
| 3000's | Span 1, North Tie |
| 4000's | Span 2, North Tie |

1.5 INSPECTION PERSONNEL

The inspection was performed by the URS-Palmer Engineering Team. Inspection personnel consisted of:

URS

Dallas Montgomery, PE (Project Manager)
Craig Klusman, PE
Travis Baker, EIT

Palmer Engineering

Kevin Thompson, PE
Jennifer Cook, EIT
Sam Cullum, EIT

Coll Bowhay of Derby City Engineering & Inspection, Inc. (DCEI) provided the non-destructive testing.

1.6 DATE OF INSPECTION

The URS-Palmer Engineering Team inspected the Sherman Minton Bridge between Monday, November 5, 2007 and Thursday, November 8, 2007.

2.0 HISTORY OF TIE CHORD TESTING & INSPECTION

2.1 GENERAL

In 1992 and 1993 a complete arms-length inspection of the Sherman Minton Bridge was performed by Hazelet + Erdal. Non-destructive testing methods were also used on various welds in the fracture-critical tie chords. These methods included magnetic particle testing, ultrasonic testing, and acoustic emissions testing. Following the inspections, a number of the cracks found were repaired by drilling or by removing diaphragm lugs.

To verify the soundness of the repairs, monitor the status of known cracks, and to test the bridge for any new cracking, INDOT requested that all areas of the tie chords be retested in a series of subsequent bridge inspections. This began with the 1999 inspection, when non-destructive testing was performed on both of the south tie chords. In 2004, non-destructive testing continued on the Span 1 North tie Chord. In combination with the 1999 and 2004 inspection, the 2006 inspection completed the retesting of all welded connections of all four tie chords. During the current inspection (2007), non-destructive testing was used to check previous significant findings.

See Appendix B for a comparison of the findings from all inspections since 1992.

2.2 1992-1993 INSPECTION

In addition to a complete arms-length inspection, non-destructive testing was performed on a large percentage of welded details. Mechanical Consulting Services, of Atlanta, Georgia, performed the testing in September-October 1992.

All surfaces were sand blasted and/or power wire brushed before testing. Some grinding was also necessary to remove heavy paint scaling and existing weld metal so that a valid inspection could be performed. All test areas were repainted following the inspection.

2.2.1 Lug Welds

At every other panel point and at each mid-panel point, $\frac{3}{8}$ " steel diaphragm plates are located in the tie chord. Each diaphragm is connected to the tie chord by 8 to 10 lugs. Fillet welds join the lug to the tie chord and diaphragm. In the 1992 inspection, all 1263 diaphragm lug welds were subject to magnetic particle testing. The testing identified 247 welds that contained cracks of varying degrees. None of the cracks appeared to have propagated into the base metal of the fracture critical tie chord.

To verify the soundness of the base metal, 50 of these locations were removed in August and September 1993. The majority of the lugs were removed by arc gouging, however some lugs could be removed with a simple tap of a hammer. After removal, the remaining weld metal was ground flush with the base metal. The surface was then subject to magnetic particle and ultrasonic testing procedures. The testing indicated that none of the cracks had propagated into the base metal of the tie chord.

2.2.2 Butt Welds

Generally, butt welds are located in each tie chord plate on both sides of a panel point. In 1981, Pittsburgh Testing Laboratories identified 35 butt welds that contained miscellaneous defects. These 35 locations were subject to magnetic particle and ultrasonic testing by Mechanical Consulting Services in 1992. Recordable crack indications were discovered in 3 of the 35 tested locations. Some of the cracks were removed or arrested by drilling a hole through the steel plate and then retested.

2.2.3 Lateral Connection Plate Welds

Groove welds are located between the lateral connection plate and the vertical tie chord plates at each panel point. A total of 89 crack indications were identified at 23 weld locations; however none of these cracks had propagated into the base metal. At one location, a transverse indication was removed for sampling in the laboratory.

2.2.4 Miscellaneous Welds

A number of other welds on the tie chord were inspected and tested during the 1992 inspection. These included tack welds on tie chord gusset plates, tack welds on the backsides of tie chord diaphragms, tie chord to floorbeam frame connector plates, and longitudinal tie chord member welds.

2.3 1999 INSPECTION

BRW Hazelet & Erdal (now URS) performed an arms-length visual inspection of all four fracture-critical tie chords in 1999. In addition, non-destructive testing was performed along both of the south (downstream) tie chords, and in some of the critical areas of the north (upstream) tie chord. Non-destructive testing consisted of both magnetic particle and ultrasonic testing. Metallurgic Services Company provided the non-destructive testing.

2.3.1 Lug Welds

The condition of the lug welds between the interior diaphragms and adjacent tie chord was assessed by magnetic particle testing. The findings were compared with the condition of the lug welds as stated in the 1992 inspection report. Due to the heavy paint on the welds and less than ideal testing conditions, only 65% of the previously noted crack indications were found. Six new crack indications were detected; however, testing results indicated that none of the crack indications had propagated into the base metal of the tie chord.

2.3.2 Butt Welds

The majority of the butt welds in the south tie chords were subjected to magnetic particle testing. Ultrasonic testing was used on eight new crack indications that were found in six different butt welds. Three of the crack indications appear to have propagated into the base metal of the steel, but not past the heat-affected zone. Monitoring their condition and retesting using non-destructive testing in two years was recommended.

2.3.3 Lateral Connection Plate Welds

Every lateral connection plate weld in the south tie chord was tested by the magnetic particle method. Five crack indications were found which were previously undetected. Magnetic particle testing did not detect a number of the previously found indications due to the heavy paint on the welds. Testing indicated that none of the cracks have propagated into the base metal of the tie chord.

2.3.4 Miscellaneous Welds

In one of the miscellaneous areas (Span 1, South Tie Chord, East of T20), six additional crack indications were discovered in the fillet weld between the north and top plates of the tie chord. Ultrasonic testing indicated that two of these crack indications have propagated into the heat affected zone of the vertical plate. Monitoring their condition and retesting using non-destructive testing in two years was recommended.

2.4 2004 INSPECTION

URS, along with Palmer Engineering, performed an arms-length visual inspection of all four fracture-critical tie chords in 2004. In addition, non-destructive testing was performed along the Span 1 North Tie Chord from L0 to T9 and along the Span 2 North (upstream) Tie Chord. Non-destructive testing consisted of both magnetic particle and ultrasonic testing. Derby City Engineering and Inspection provided the non-destructive testing.

2.4.1 Lug Welds

The condition of the lug welds in the Span 2 North Tie Chord between the interior diaphragms and adjacent tie chord was assessed by magnetic particle testing. The findings were compared with the condition of the lug welds as stated in the 1992 inspection report. Due to the heavy paint on the welds and less than ideal testing conditions, only 43% of the previously noted crack indications were found. Two new crack indications were detected. Testing results indicated that none of the crack indications had propagated into the base metal of the tie chord.

2.4.2 Butt Welds

Every butt weld in the Span 2 North Tie Chord and between L0 and T9 of the Span 1 North Tie Chord was subject to magnetic particle testing. This included all the interior welds in addition to both exterior vertical plates and the top plates. The bottom 6" of the exterior vertical plates and the bottom of the bottom plate were not accessible from the tie chord. Ultrasonic testing was performed on all butt weld indications for verification and to determine the depth of the indications. The three crack indications that were noted to have propagated into the base metal of the steel but not past the heat-affected zone were retested and reported to be in the same condition as the 1999 Inspection.

2.4.3 Lateral Connection Plate Welds

Every lateral connection plate weld along the Span 2 North Tie Chord and between L0-T9 in the Span 1 North Tie Chord was subject to magnetic particle testing. One crack indication was found which had not previously been detected. Magnetic particle testing did not detect a number of the previously found indications due to the heavy paint on the welds.

2.4.4 Miscellaneous Welds

In one of the miscellaneous areas (Span 1 South Tie Chord, East of T20), twelve additional crack indications were discovered in the fillet weld between the north and top plates of the tie chord. Multiple rain days during the 2004 inspection prevented further testing at this location. Monitoring their condition and retesting using non-destructive testing in two years was recommended.

2.5 2006 INSPECTION

URS, along with Palmer Engineering, performed an arms-length visual inspection of all four fracture-critical tie chords in 2006. A SNOOPER was used to access the lower 6" of the exterior of the vertical plates and the bottom of the bottom plate. In addition, non-destructive testing was performed along the length of all tie chord segments. Non-destructive testing consisted of both magnetic particle and ultrasonic testing. Derby City Engineering and Inspection provided the non-destructive testing.

2.5.1 Butt Welds

Magnetic particle testing and inspection of the butt welds on all four tie chords revealed four longitudinal crack indications. Longitudinal indications are the most critical in this case because they are perpendicular to the main line of tensile stress in the tie chord. A radiograph was performed on the crack in the Span 2 South Tie Chord East of T12. This test resulted in an accurate and permanent record of the crack.

2.5.2 Lug Welds

The lug welds in the Span 1 North Tie Chord were subject to magnetic particle testing. Their condition had not changed since the previous inspection.

2.5.3 Lateral Connection Plate Welds

A portion of the lateral connection plate welds in all four tie chords were subject to magnetic particle testing. One new crack, at Floorbeam 16 East, was found.

3.0 INSPECTION PROCEDURES

3.1 GENERAL

Inspection procedures used for the inspection of the Sherman Minton Bridge adhered to the *Bridge Inspector's Reference Manual (2002)*, *AASHTO's Manual for Maintenance Inspection of Bridges*, *National Bridge Inspection Standards*, and *The Scope of Work*.

Other procedures used were INDOT's *Worksite Traffic Control Manual for Daylight Maintenance and Traffic Operations*, *Federal OSHA Standards*, and *URS Corporation and Palmer Engineering* corporate policies with respect to job site safety.

3.2 ACCESS EQUIPMENT

Climbing techniques utilizing safety harnesses and permanent safety cables attached to the bridge were used to inspect the fracture critical tie chord.

A 135-foot aerial boom lift was used to inspect the fracture critical members and cables in the truss arches (see Photo 3.2).



Photo 3.2: Inspecting the truss arch with the 135-foot aerial boom lift

3.3 TESTING PROCEDURES

Derby City Engineering and Inspection (DCEI) performed non-destructive magnetic particle and ultrasonic testing as directed by URS personnel.

Magnetic Particle Testing (MT) is a non-destructive method of locating surface or near surface discontinuities using the magnetization of ferromagnetic metals. Magnetic particle testing is

performed using an AC/DC Yoke and colored magnetic powder. Using the yoke at the desired testing location, a magnetic field is induced into the steel while applying the powder (see Photo 2). If there are any discontinuities in the steel, the magnetic particles are attracted to the flaw. At this time, an interpretation can be made and any indications can be recorded.

During the Sherman Minton Bridge inspection, power was supplied to the AC/DC yoke from a truck-mounted generator. The test was performed directly on the painted surfaces (see Photo 3.3a). To differentiate from the blue color of the bridge, red magnetic powder was chosen.



Photo 3.3a: DCEI performing magnetic particle testing on a tie chord butt weld

Ultrasonic Testing (UT) is a non-destructive method of detecting and characterizing internal discontinuities using a transducer that emits high frequency sound waves. Ultrasonic testing can detect both surface and subsurface flaws. These flaws, or indications, detected by ultrasonic testing may not necessarily indicate a crack. They could signify slag or other inclusions, laminations, gas pockets, incomplete weld penetration, or weld fusion.

At each testing location on the Sherman Minton Bridge, acoustic waves were emitted at a 45-degree angle from the transducer into the steel (see Photo 3.3b). If a discontinuity or flaw was present in the steel, the wave reversed and was reflected back to the transducer. From the time and return signal's magnitude, the location and depth of the flaw could be interpreted.

For the 2007 inspection, ultrasonic testing was generally only used verify positive findings from magnetic particle testing and to determine the depth of any indications.



Photo 3.3b: DCEI performing ultrasonic testing on a tie chord butt weld

4.0 SIGNIFICANT FINDINGS

Descriptions of these significant findings are included in greater detail with photographs in Appendix A, *Detailed Bridge Condition Descriptions*.

4.1 BUTT WELDS

A total of twenty-six crack indications have been found in the butt welds through the history of inspections and testing on this structure. This total includes locations which have been repaired by the use of drilling and grinding. Five of the indications (1001, 1003, 2005, 3003, and 3004) which have not been repaired are longitudinal to the butt weld. These are most critical since they are perpendicular to the main line of stress. Each of the five locations is discussed below. Refer to Appendix A for the history and photographs of these crack indications.

Indication 1001: South Tie Chord, Span 1, West of L0, Top Plate

- Non-destructive testing (magnetic particle and ultrasonic) found a 1" crack indication, ½" deep

Indication 1003: South Tie Chord, Span 1, East of T15, South Face, North Plate

- Unable to verify previously noted ¾" crack indication

Indication 2005: South Tie Chord, Span 2, East of T12, South Face, North Plate

- Magnetic particle and ultrasonic testing verified the extents of this crack as found in previous inspections

Indications 3003 & 3004: North Tie Chord, Span 1, East of T17, South Face, South Plate

- 2006 – Non-destructive testing (magnetic particle and ultrasonic) found an ⅛" indication, ⅛" deep, longitudinal to the butt weld, below the bottom hole previously drilled to prevent crack propagation.
- 2007 – Unable to verify crack indication (3003), originally found in 2006. However, a new ⅜" longitudinal indication (3004), measuring 1.3" deep according to ultrasonic testing, was found at the bottom of a previously drilled hole.

Magnetic particle testing was also used to verify all known transverse indications and the majority of previously repaired areas. None of the transverse indications had any significant growth and no defects were found at previously repaired areas.

4.2 TRUSS ARCH

Typical conditions on the truss arch included moderate surface rust, paint failure, and moderate pack rust between backer rods and interior plate faces. Heavy pack rust found at the underside of the top cable assemblages, likely caused by condensation on the interior plates of the assemblage.

4.3 INDIANA APPROACH

Time allowed for inspection of two areas of the Indiana Approach that are outside the scope of this inspection. The following significant findings were noted during this limited inspection:

- A previously found crack in the downstream vertical at panel point L5 in Span A measured 12 inches. From visual inspection, it appears that the crack has extended beyond the fourth bolt (end of crack in 1992) approximately 1 inch.
- A previously found crack at the north stringer to floorbeam connection at Pier 8 in the Indiana Approach has not grown (measured $6\frac{1}{8}$ inches) since the 1992 inspection.
- A new crack, measuring $4\frac{3}{8}$ inches, was found in south web of the Pier 8 steel bent cap at the stringer connection.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

The Sherman Minton Bridge tie chord is in overall fair to good condition. Typical conditions in the tie chord include debris, surface rust, and failing paint. The primary concern from the inspection remains the longitudinal butt weld indications discussed under *Significant Findings*.

The most critical areas to monitor are mentioned in the following sections. However, previously found butt weld, lug weld, lateral connection plate weld, and miscellaneous weld indications should continue to be monitored and tested in the near future. A *Future Inspection Plan* detailing a non-destructive testing plan as well as an inspection plan for the entire Sherman Minton Bridge is presented in Appendix E.

5.2 BUTT WELDS

This inspection continued the monitoring of crack indications previously found in the butt welds. Recent history has indicated that these cracks are either not growing or growing at a slow rate. An increased growth rate could necessitate the need of immediate repair or removal of these indications. The five longitudinal crack indications in the butt welds are the most critical since they are perpendicular to the main line of stress. It is important to continue to closely monitor all of these crack indications, including transverse indications, for growth.

With current data, it is difficult to accurately report if the crack indications found during recent inspections are truly new or if they were not previously detected by non-destructive testing. The consultant inspection team and INDOT feel it is beneficial to continue monitoring these indications in lieu of an immediate retrofit. Leaving these cracks in place over the next few years allows the team to gather overall conclusions regarding the behavior of the tie chords. The ultimate goal is to determine the likely cause of these cracks and to develop and implement a plan to eliminate existing crack propagation and to reduce or eliminate development of future cracks.

Indication 1001: South Tie Chord, Span 1, West of L0, Top Plate

A crack indication was verified that is longitudinal to the butt weld on the top horizontal plate. This previously recorded indication was originally found in 2006. The length has remained fairly constant (1"); however, ultrasonic testing found the depth of the crack to be 0.55" (compared to 0.13" in 2006).

It is recommended to continue monitoring this indication, as it does not appear this is an active indication.

Indication 1003: South Tie Chord, Span 1, East of T15, South Face, North Plate

Magnetic particle testing was unable to verify a previously found crack indication that is longitudinal to the butt weld on the main load carrying vertical plate. This indication was reported in 1999 and 2006 as 0.75" long.

It is recommended to continue monitoring this location on an annual basis.

Indication 2005: South Tie Chord, Span 2, East of T12, South Face, North Plate

A longitudinal crack was detected at this location in 1999 and the 2004 inspection noted that this indication (approximately 1¼" long) turned approximately 45 degrees at each end and extended ¾". Measurements from a radiographic test in 2006 and magnetic particle testing in 2006 and 2007 indicate that the crack is slightly shorter than found in 2004. However, the depth has remained fairly constant since 1999, with a maximum depth of 1¼" recorded during this inspection.

The crack indication does not appear to be active perpendicular to the main line of stress. It is possible that a secondary stress is causing the crack to turn and may be a result of rotation of the nearby joint or internal forces redistributing stress due to the possible loss of section.

Due to the depth of this indication, a detailed study and analysis is recommended to determine the capacity of this tie chord section and to determine if a retrofit is warranted. Until a detailed study can be completed, it is recommended to continue monitoring this location.

Indications 3003 & 3004: North Tie Chord, Span 1, East of T17, South Face, South Plate

A previously noted crack indication (3003) was not found; however, a new indication (3004) was found along the butt weld. Both of the indications are longitudinal to the butt welds on the main load carrying vertical plate. In the area of these indications, three sets of arrest holes have been drilled in the past to prevent crack propagation. In the 2006 and 2007 inspections, short indications have been noted beyond the arrest holes in two of the holes.

The history of the butt welds in this area are not fully known. It was indicated in the 1992 report that the holes had already been drilled at the time of inspection. The presumed cause of this defect could not be determined from past inspection reports.

It is recommended that the indications be removed by grinding and that the areas continue to be monitored.

5.3 LATERAL CONNECTION PLATE WELDS

The results from a visual inspection of the lateral plate connection welds generally agreed with previous findings.

Since some of the indications are perpendicular to the main line of stress in the tie chord, it is recommended to perform non-destructive testing on all previous lateral connection plate weld findings in the next inspection.

5.4 LUG WELDS

Previous inspection and testing of the lug welds have shown that the indications are generally in the fillet weld of the lug and have not propagated into the base metal of the tie chord. The results from a visual inspection of the lug welds generally agreed with previous findings. It is recommended to commence the next round of lug weld testing in the near future, as some of the lug welds have not been tested since the 1999 inspection.

5.5 MISCELLANEOUS WELDS

It is recommended that special consideration should continue to be given to the fillet weld in the Span 1 South Tie Chord, East of PP20, where twelve transverse cracks were detected in 1999.

5.6 MAINTENANCE RECOMMENDATIONS

- Clean the structure of debris.
- Clean and paint top cable assemblies to remove active rust. Also seal all open gaps.
- Paint the structure to mitigate surface rust and corrosion of the structural steel.
- Clean clogged drains.

5.7 REPAIR RECOMMENDATIONS

These repair items should be performed within the next 2 years to maintain the useful life of the structure.

- Replace joints at Panel Point 11 in both Spans 1 and 2 of the westbound deck.
- Drill an arresting hole at the end of the crack found in the south web of the cross girder at the stringer connection, Pier 8 in Indiana Approach. Verify removal by using magnetic particle testing.

APPENDIX A

DETAILED BRIDGE CONDITION DESCRIPTIONS

BRIDGE INSPECTION REPORT

SHERMAN MINTON BRIDGE I-64 OVER THE OHIO RIVER AT NEW ALBANY, INDIANA FLOYD COUNTY BRIDGE NO. I-64-103-4961B

DETAILED BRIDGE CONDITION DESCRIPTIONS

This bridge inspection was not intended to be a detailed arms-length inspection; therefore all bridge components were not formally inspected. The descriptions provided below are only for the areas of the bridge inspected, as outlined in the *Scope of Inspection* section of this report. For bridge components outside of the scope, limited comments from a cursory inspection are provided.

58 DECK CONDITION

58.01 Wearing Surface: The eastbound and westbound wearing surfaces are in good condition, with only minor widespread staining on the westbound surface.

58.02 Deck - Underside: The underside of the westbound deck has some small spalls ($<1 \text{ ft}^3$) and minor widespread transverse and map cracking with efflorescence. The areas on the underside of the eastbound deck, which were visible from the inspection walkway, showed minor to moderate spalling of the stringer haunches, as well as minor widespread cracking with efflorescence.



Photo 58.02: Typical spalling of stringer haunch

- 58.03 Curbs:** The curb faces on the westbound deck have minor widespread spalling. The curb faces on the eastbound bridge are in good condition.
- 58.08 Railing/Post:** Many railing supports have minor to moderate cracking. Several have small spalls near the connection to the railing (see Photo 58.08a). In addition, many edge reflectors on the eastbound deck are broken or missing (approximately 10-15% of the yellow markers and 15-20% of the white markers) (see Photo 58.08b).



Photo 58.08a: Cracking and spalling in railing support on eastbound deck



Photo 58.08b: Broken edge reflector on eastbound deck

- 58.10 Drains:** The drains are in fair condition due to excessive buildup of debris. There are approximately 13 clogged drains on the westbound deck and 2 clogged drains on the eastbound deck.
- 58.12 Lights:** A light pole on the north side of the westbound deck in Span 2 near Panel Point 6 which is bent outward over the river (see Photo 58.12).



Photo 58.12: Bent light pole in Span 2 near Panel Point 6

- 58.16 Transverse Joints:** Most of the joints are in good to fair condition. Failing seals and excessive debris were the most significant problems found. These conditions are described below, followed by Table 58.16 summarizing the condition of all the joints on the bridge.

The seals in the expansion joints of the westbound deck at Panel Point 11 in Span 1 and Span 2 have failed completely. The seals have been torn away from the armored edges (see Photo 58.16). The joint in the eastbound deck at Pier 7 is exhibiting similar problems, though the seal is still mostly intact.



Photo 58.16: Failed expansion joint at Panel Point 11 in Span 1

Table 58.16: Transverse Joint Condition Summary

| Location | Type | Condition | Notes |
|---------------------------|--------------|--------------|--|
| Westbound Deck | | | |
| Panel Point 0 (Pier 1) | Asphalt Plug | Good | |
| Panel Point 11 (Span 1) | Strip Seal | Poor | Seal pulled away from armored edges. |
| Panel Point 0/22 (Pier 2) | Finger | Good | |
| Panel Point 11 (Span 2) | Strip Seal | Poor | Seal pulled away from armored edges. |
| Panel Point (Pier 3) | Finger | Good | Span 2 fingers ~1/4" higher than Span 3. |
| Approach Joints | Various | Fair to Good | |
| Eastbound Deck | | | |
| Abutment 10 | Asphalt Plug | Fair | Minor to moderate spalling of asphalt. |
| Pier 9 | Asphalt Plug | Fair | |
| Pier 8 | Asphalt Plug | Fair | Minor spalling of asphalt. |
| Pier 7 | Strip Seal | Fair | Seal is overstretched but intact. |

| | | | |
|---------------------------|--------------|------|---|
| Pier 6 | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 2' (Span C) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 4' (Span C) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 6' (Pier 5) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 8' (Span B) | Asphalt Plug | Good | Minor sagging (~1/2") and map cracking. |
| Panel Point 8 (Span B) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 6 (Pier 4) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 4 (Span A) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 2 (Span A) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 22 (Pier 3) | Finger | Fair | Span 2 fingers ~1/2" higher than Span 3. Heavy debris in trough. |
| Panel Point 19 (Span 2) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 15 (Span 2) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 11 (Span 2) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 7 (Span 2) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 3 (Span 2) | Asphalt Plug | Good | Minor cracking and slight sagging. |
| Panel Point 0/22 (Pier 2) | Finger | Fair | Moderate debris in trough. |
| Panel Point 19 (Span 1) | Asphalt Plug | Good | Minor cracking at asphalt/concrete interface. |
| Panel Point 15 (Span 1) | Asphalt Plug | Fair | Moderate cracking and slight separation. 3'x1' spall in middle lane. |
| Panel Point 11 (Span 1) | Asphalt Plug | Good | Minor cracking and slight separation. |
| Panel Point 7 (Span 1) | Asphalt Plug | Good | Minor cracking and slight sagging. |
| Panel Point 3 (Span 1) | Asphalt Plug | Good | Minor cracking in adjacent concrete. |
| Panel Point 0 (Pier 1) | Asphalt Plug | Fair | Moderate transverse cracking in asphalt. Small (<0.5ft ³) spall in right lane. |

59A SUPERSTRUCTURE CONDITION

59A.01 Bearings: In a cursory inspection of the bearings in the westbound Indiana Approach, the following deficiencies were noted:

- The stringer bearings at Pier 8 have been retrofitted with elastomeric pads. The repair was poorly constructed due to improperly sized anchor bolts and poor quality welds.

- Several of the anchor bolts for the cross girder bearings on the pier columns exhibit deficiencies that include mis-drilled holes, bent anchor bolts, improperly installed anchor bolts, and loose nuts. These conditions do not appear to be affecting the structural integrity of the bearings.

59A.02 Steel Girders: In a cursory inspection of the girders in the westbound Indiana Approach, the following deficiencies were noted:

- There is heavy surface rust and minor pitting on the top flange of the cross girder and top flange stiffening plate at Pier 9.
- There is a $6\frac{1}{8}$ " crack in the angle connecting the fourth stringer from the south to the west face of the cross girder at Pier 8. This crack was found in 1992 and does not appear to be active.
- There is a $4\frac{3}{8}$ " crack in the east face of the cross girder web at Pier 8 at the support connection for the fourth stringer from the south (see Photo 59A.02).



Photo 59A.02: Crack in east face of cross girder web

59A.12 Arches: The Span 1 and Span 2 truss arches are discussed in this section.

The truss arches are in good condition. Minor to moderate widespread paint failure and surface rust was commonly found on the members and connections. Minor ($\sim\frac{1}{8}$ "") to heavy ($\sim\frac{1}{2}$ "") pack rust was also found between the gusset plates and truss arch members at several locations.

The truss arch members have diaphragm plates which are connected with fillet welded lugs, similar to those in the tie chord. Though no problems were found with these welds, they should continue to be monitored during future inspections.

Backer rods are tack welded to many of the truss arch members. These tack welds can create stress risers in the truss arch members. Many of them have broken, leaving the backer rods loose inside the members. Currently, minor pack rust has formed between some of the backer rods and truss arch members (see Photo 59A.12).



Photo 59A.12: Pack rust between backer rod and truss arch member

59A.15 Stringers: In the main spans, the stringer ends under expansion joints have moderate surface rust.

The tack welds on the main span stringers, which were visible from the inspection walkway, are in fair condition. The tack welds were used to hold the diaphragm connection angles to the stringer webs for riveting and many have broken since they were placed. No resulting deficiencies were noted in the stringers during a cursory inspection of these welds.

59A.16 Floorbeams: The floorbeam under the expansion joint at Panel Point 15 in Span 1 has heavy rusting and minor loss of section on the top flange and splice plates (see Photo 59A.16).



Photo 59A.16: Deterioration on floorbeam at Panel Point 15

59A.18 Trusses: The deck through trusses in Spans A – C are discussed in this section. Only a previously noted deficiency at panel point L5 in Span A of downstream truss was inspected. Time did not allow for a complete inspection of the deck through truss spans.

A previously found crack in the downstream vertical at panel point L5 in Span A measured 12 inches. From visual inspection, it appears that the crack has extended beyond the fourth bolt (end of crack in 1992) approximately 1 inch.



Photo 59A.18: Crack in south flange of vertical at L5 on south truss

59A.23 Lower Chords: The tie chords in Span 1 and Span 2 are discussed in this section.

The tie chords are in fair condition. Typical conditions include crack indications in the tie chords welds, moderate rusting and flaking of the paint, isolated areas of active corrosion, and debris accumulation (see Photo 59A.23a).



Photo 59A.23a: Debris and rusting bolts inside connection at T11 on the north tie

Significant findings and previously found crack indications on the tie chords were checked by visual inspection. In addition, the conditions of the majority of known butt weld crack indications were verified through the use of nondestructive testing (NDT). NDT consisted of Magnetic Particle Testing (MT) and Ultrasonic Testing (UT).

The results from a visual inspection of the lug welds and lateral plate connection welds generally agreed with previous findings. However, since these welds were only inspected using visual methods, re-inspection using nondestructive testing would be required for an accurate comparison with previous inspections.

Tables of the results comparing the lug weld, butt weld, and lateral plate connection weld crack indications from previous inspections is presented in Appendix B.

A total of twenty-six crack indications have been found in the butt welds through the history of inspections and testing on this structure. This total includes locations which have been repaired. Five of the indications (1001, 1003, 2005, 3003, and 3004) which have not been repaired are longitudinal to the butt weld. These are most critical since they are perpendicular to the main line of stress. Each of the five locations is discussed in detail below.

Indication 1001: South Tie Chord, Span 1, West of L0, Top Plate

- 2006 – NDT (MT & UT) found a $\frac{13}{16}$ " crack indication, $\frac{1}{8}$ " deep
- 2007 – NDT (MT & UT) found a 1" crack indication, $\frac{1}{2}$ " deep

Indication 1003: South Tie Chord, Span 1, East of T15, South Face, North Plate

- 2006 – NDT (MT) found a $\frac{3}{4}$ " crack indication

- 2007 – Could not locate

Indication 2005: South Tie Chord, Span 2, East of T12, South Face, North Plate

- 1999 – Approx. 1¼” long crack indication, 1” deep
- 2004 – MT indicated that the crack has extended ¾” toward the base metal at an approximate 45 degree angle at both ends. UT indicated that the crack is approximately 1” deep on the longitudinal section and approximately ¼” in the diagonal portions
- 2006 – MT indicated that the crack as 1⅛” long longitudinally and ⅜” long on the 45 degree angles at both ends. UT indicated that the crack is approx. ¾” deep on the longitudinal section. Radiograph test was performed at the indication to have a permanent record of the defect
- 2007 – MT indicates that the crack as 1⅛” long longitudinally, ¼” on the top left arm, and ¾” long on the bottom right arm, and 1¼” deep
- The crack remains in the weld and has not extended into the base metal
- No repair has been done at this location



Photo 59A.23b: Crack indication 2005

Indications 3003 & 3004: North Tie Chord, Span 1, East of T17, South Face, South Plate

- 2006 – NDT (MT & UT) found an ⅛” indication, ⅛” deep, longitudinal to the butt weld below the bottom of the arrestor hole previously drilled to prevent crack propagation.

- 2007 – Unable to verify crack indication (3003), originally found in 2006. However, a new $\frac{3}{16}$ " longitudinal indication (3004), measuring 1.3" deep according to ultrasonic testing, was found at the bottom of a previously drilled hole.

Photo 59A.23c: Crack indication 3004

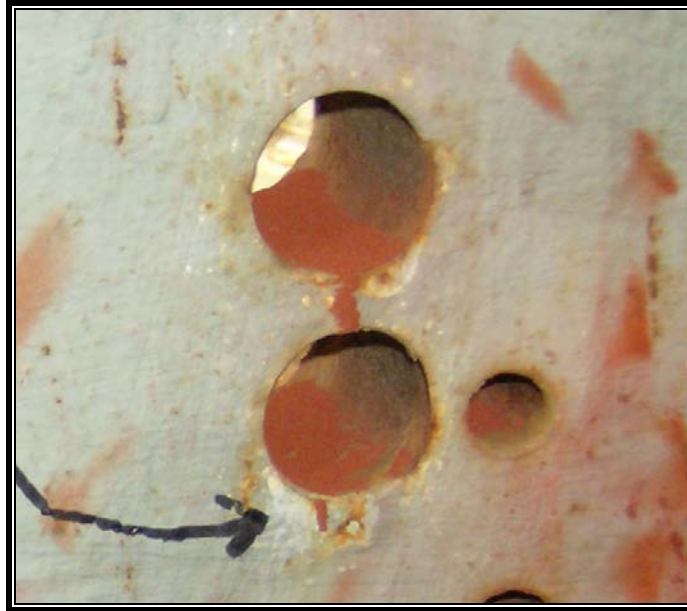


Photo 59A.23c: Crack indication 3004

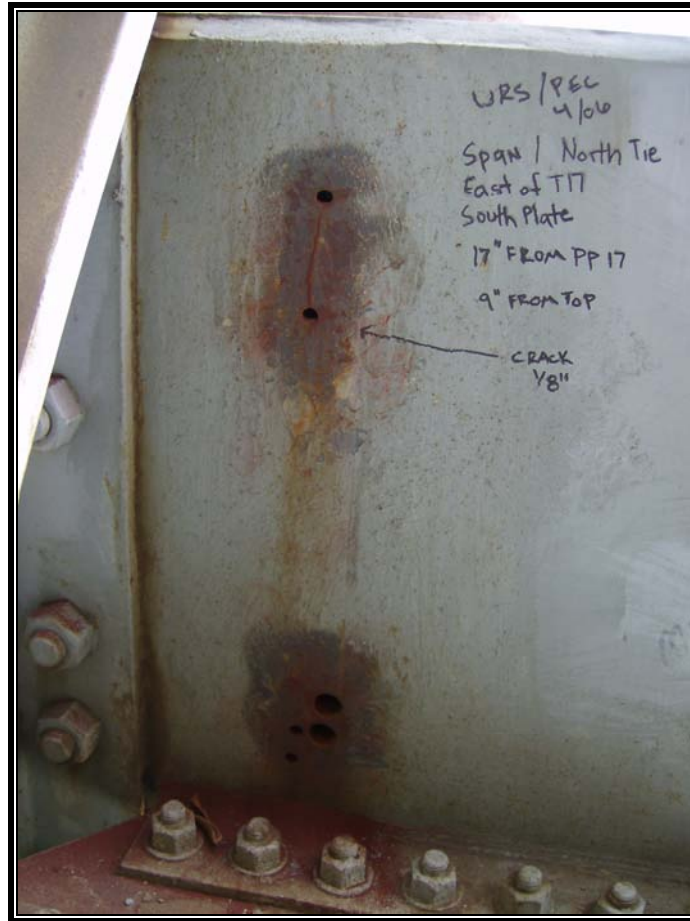


Photo 59A.23d: Crack indications 3003 (top), 3004 (bottom right), and 3005 (bottom left)

59A.38 Tack Welds: Tack welds are found in many locations throughout this structure, including the backer rods on the truss arch members (see 59A.12), the diaphragm connection angles on the main span stringers (see 59A.15), and the splice or gusset plates on the tie chords. The tie chord tack welds were not tested during this inspection.

59A.41 Hangers: The cables, top cable assemblies, and bottom cable assemblies are discussed in this section.

The cables and bottom cable hangers are in good condition. Only minor paint failure on the cables and minor surface rust on the hangers were noted.

The top cable hangers are in fair condition. It appears that water is penetrating the top cover plates and causing minor to heavy surface rust on the keeper plates, typically inside the drain hole. This condition was observed on nearly all of the top cable hangers. In the worst locations, the corrosion has extended onto the outside of the keeper plates and formed pack rust between the plates, sockets and castings (see Photo 59A.41a thru 59A.41c).



Photo 59A.41a: Top cover plate on top cable hanger



Photos 59A.41b: Typical condition of top cable hanger



Photos 59A.41c: Heavy rusting on top cable hanger at Panel Point 8 in Span 1

APPENDIX B

DOCUMENTED CRACK INDICATIONS

TABLE 1: DOCUMENTED BUTT WELD INDICATIONS

TABLE 2: DOCUMENTED LUG WELD INDICATIONS

**TABLE 3: DOCUMENTED LATERAL CONNECTION PLATE
WELD INDICATIONS**

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 1: DOCUMENTED BUTT WELD INDICATIONS

| NUMBER | TIE-SPAN | LOCATION | PLATE | DIST. FROM TOP PLATE (in) | ORIENTATION | LENGTH (in) (As Determined by MT) | | | | | | DEPTH (in) (As Determined by UT) | | | | | | NOTES |
|--------|----------|------------|-------|---------------------------|-------------|--------------------------------------|------|------|------|------|--|-------------------------------------|------|------|------|------|--|---|
| | | | | | | | | | | | | | | | | | | LEGEND |
| | | | | | | 1992 | 1999 | 2004 | 2006 | 2007 | | 1992 | 1999 | 2004 | 2006 | 2007 | | N - North LO - Longitudinal to Weld S - South TR - Transverse to Weld T - Top NRI - No Recordable Indication * - Distance From North Plate ■ - Testing Not Performed |
| 1001 | S-1 | L0 - West | T | 0.00* | LO | NRI | NRI | NRI | 0.81 | 1.00 | | ■ | ■ | ■ | 0.13 | 0.55 | | |
| 1002 | S-1 | T4 - East | N | 29.50 | TR | NRI | NRI | NRI | 0.75 | 0.25 | | ■ | ■ | ■ | 0.38 | NRI | | |
| 1003 | S-1 | T15 - East | N | 0.00 | LO | NRI | 0.75 | ■ | 0.75 | NRI | | ■ | ■ | ■ | NRI | ■ | | |
| 1004 | S-1 | T17 - West | N | - | TR | NRI | NRI | ■ | NRI | NRI | | ■ | ■ | ■ | ■ | ■ | | 1992: 3 indications were found and 2 were removed. |
| 1005 | S-1 | T18 - East | N | 5.38 | TR | NRI | 0.50 | ■ | 0.38 | 0.31 | | ■ | 0.50 | ■ | 0.13 | NRI | | |
| 1006 | S-1 | T18 - East | N | 6.38 | TR | NRI | 1.13 | ■ | 1.13 | 0.75 | | ■ | 1.13 | ■ | 0.38 | NRI | | |
| 1007 | S-1 | T18 - East | N | 17.50 | TR | NRI | 1.25 | ■ | 1.25 | 1.25 | | ■ | 1.13 | ■ | 0.13 | NRI | | |
| 1008 | S-1 | T19 - West | N | 19.50 | TR | NRI | 1.13 | ■ | 1.13 | 1.13 | | ■ | 0.50 | ■ | 0.50 | NRI | | |
| 2001 | S-2 | T2 - East | N | - | - | NRI | NRI | ■ | NRI | NRI | | ■ | ■ | ■ | ■ | ■ | | 1992: 4" dia. hole drilled in weld. |
| 2002 | S-2 | T4 - West | T | 9.00* | TR | NRI | NRI | 0.75 | 0.75 | 0.88 | | ■ | ■ | 0.50 | 0.63 | NRI | | 2006: Found on int. and ext. of plate. Represents full depth crack. |
| 2003 | S-2 | T6 - East | T | - | - | NRI | NRI | ■ | NRI | ■ | | ■ | ■ | ■ | ■ | ■ | | 1992: 4" dia. hole drilled in weld. |
| 2004 | S-2 | T7 - West | S | 11.00 | TR | NRI | NRI | ■ | 1.56 | 1.50 | | ■ | ■ | ■ | 0.75 | NRI | | |
| 2005 | S-2 | T12 - East | N | 28.75 | LO | NRI | 1.25 | 2.75 | 1.88 | 1.75 | | ■ | 0.88 | 1.00 | 0.75 | 1.25 | | 2004: Ends have turned. |

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 1: DOCUMENTED BUTT WELD INDICATIONS


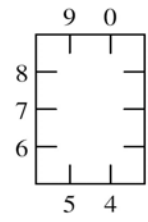
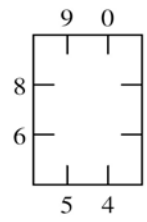
| NUMBER | TIE-SPAN | LOCATION | PLATE | DIST. FROM TOP PLATE (in) | ORIENTATION | LENGTH (in) (As Determined by MT) | | | | | | DEPTH (in) (As Determined by UT) | | | | | | NOTES |
|--------|----------|------------|-------|---------------------------|-------------|--------------------------------------|------|-------|------|------|--|-------------------------------------|------|------|------|------|--|---|
| | | | | | | | | | | | | | | | | | | LEGEND |
| | | | | | | 1992 | 1999 | 2004 | 2006 | 2007 | | 1992 | 1999 | 2004 | 2006 | 2007 | | N - North LO - Longitudinal to Weld S - South TR - Transverse to Weld T - Top NRI - No Recordable Indication * - Distance From North Plate ■ - Testing Not Performed |
| 2006 | S-2 | T19 - West | N | 12.25 | TR | NRI | 1.19 | 1.19 | 1.25 | 1.19 | | ■ | 1.00 | 1.00 | 0.25 | NRI | | 0.19" into base metal. |
| 2007 | S-2 | T19 - West | N | 16.25 | TR | NRI | 1.19 | 1.19 | 1.25 | 1.19 | | ■ | 0.75 | 0.75 | 0.38 | NRI | | 0.25" into base metal. |
| 2008 | S-2 | T19 - West | N | 18.75 | TR | NRI | 0.50 | 1.00 | NRI | NRI | | ■ | 0.38 | 0.50 | ■ | ■ | | |
| 3001 | N-1 | T10 - West | N | 16.50 | TR | 1.50 | 1.50 | 1.63 | 1.63 | 1.50 | | ■ | 0.25 | 0.25 | 0.25 | NRI | | |
| 3002 | N-1 | T10 - West | N | 25.00 | TR | 1.38 | 1.38 | 1.50 | 1.50 | 1.25 | | ■ | 0.25 | 0.25 | 0.25 | NRI | | |
| 3003 | N-1 | T17 - East | S | 9.00 | LO | 8.00 | NRI | NRI | 0.13 | NRI | | NRI | ■ | ■ | 0.13 | ■ | | 1992: 8" indication drilled at ends. 2006: 0.13" indication found below btm. hole. |
| 3004 | N-1 | T17 - East | S | 20.50 | LO | 0.25 | NRI | NRI | NRI | 0.19 | | NRI | ■ | ■ | ■ | 1.30 | | 1992: 0.25" indication drilled at ends. 2007: 0.19" indication found below btm. hole. |
| 3005 | N-1 | T17 - East | S | 22.50 | LO | 1.00 | NRI | NRI | NRI | NRI | | NRI | ■ | ■ | ■ | ■ | | 1992: 1" indication drilled at ends. |
| 4001 | N-2 | T1 - East | N | 25.75 | TR | NRI | NRI | NRI | 1.00 | 1.00 | | ■ | ■ | ■ | 0.13 | NRI | | |
| 4002 | N-2 | T2 - West | N | 12.50 | TR | NRI | ■ | 0.50 | NRI | 0.50 | | ■ | ■ | 0.25 | ■ | NRI | | |
| 4003 | N-2 | T4 - East | S | 29.00 | LO | NRI | ■ | 10.00 | NRI | NRI | | ■ | ■ | 0.50 | ■ | ■ | | 2004: Indication removed by grinding. |
| 4004 | N-2 | T10 - East | N | 1.00 | TR | NRI | NRI | NRI | 1.00 | 0.88 | | ■ | ■ | ■ | 0.13 | NRI | | |
| 4005 | N-2 | T21 - East | S | 15.00 | LO | NRI | ■ | 5.50 | NRI | NRI | | ■ | ■ | 0.25 | ■ | ■ | | 2004: Indication removed by grinding. |

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|--------------------------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | | | | | | | <u>WELD CRACK LEGEND</u> A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication ■ - Testing Not Performed | |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | | |
| SPAN 1 - SOUTH TIE CHORD | | | | | | | | | |
| MPP 0-1 | 1011 | D | D | | | | | | |
| | 1012 | A | A | | | | | | |
| | 1013 | B | R | | | | | | |
| | 1016 | A | A | | | | | | |
| PP 1 | 1021 | A | A | | | | | | |
| | 1023 | A | A | | | | | | |
| | 1024 | ? | | | | | | | |
| | 1026 | D | D | | | | | | |
| | 1028 | D | D | | | | | | |
| | 1029 | D | D | | | | | | |
| | 1020 | D | R | | | | | | |
| MPP 1-2 | 1031 | D | D | | | | | | |
| | 1032 | B | R | | | | | | |
| | 1033 | D | D | | | | | | |
| | 1037 | A | NRI | | | | | | |
| | 1038 | B | B | | | | | | |
| | 1030 | A | | | | | | | |
| MPP 2-3 | 1048 | A | NRI | | | | | | |
| PP 3 | 1051 | A | A | | | | | | |
| | 1053 | A | A | | | | | | |
| | 1055 | A | | | | | | | |
| | 1056 | A | NRI | | | | | | |
| | 1059 | D | D | | | | | | |
| | 1050 | D | D | | | | | | |
| MPP 3-4 | 1062 | NRI | A | | | | | | |
| | 1066 | NRI | A | | | | | | |
| | 1067 | NRI | A | | | | | | |
| | 1068 | A | A | | | | | | |
| MPP 4-5 | - | NRI | NRI | | | | | | |
| PP 5 | 1081 | A | A | | | | | | |
| | 1083 | A | A | | | | | | |
| | 1088 | B | R | | | | | | |
| MPP 5-6 | 1094 | C | C | | | | | | |

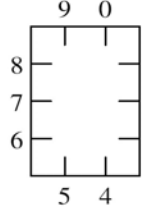
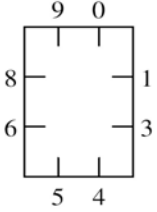
Middle Panel Point
(MPP)
Odd Panel Point
(PP)

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS


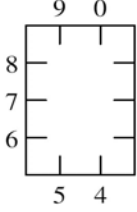
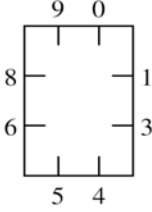
| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|-----------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | | | | | | | WELD CRACK LEGEND A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication  - Testing Not Performed | |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | |  Middle Panel Point (MPP) |  Odd Panel Point (PP) |
| MPP 6-7 | 1108 | A | | | | | | | |
| PP 7 | 1113 | C | C | | | | | | |
| MPP 7-8 | 1125 | C | NRI | | | | | | |
| | 1126 | A | NRI | | | | | | |
| | 1120 | F | | | | | | | |
| MPP 8-9 | 1133 | A | NRI | | | | | | |
| | 1134 | E | NRI | | | | | | |
| | 1137 | E | R | | | | | | |
| PP 9 | 1146 | A | A | | | | | | |
| | 1148 | A | NRI | | | | | | |
| MPP 9-10 | 1151 | D | D | | | | | | |
| | 1152 | A | NRI | | | | | | |
| | 1156 | A | NRI | | | | | | |
| | 1157 | A | NRI | | | | | | |
| | 1158 | A | A | | | | | | |
| MPP 10-11 | 1162 | A | R | | | | | | |
| PP 11 | 1174 | A | NRI | | | | | | |
| | 1179 | NRI | A | | | | | | |
| | 1170 | NRI | A | | | | | | |
| MPP 11-12 | 1186 | D | R | | | | | | |
| MPP 12-13 | 1192 | A | R | | | | | | |
| PP 13 | 1201 | B | B | | | | | | |
| | 1203 | A | A | | | | | | |
| | 1204 | A | | | | | | | |
| | 1209 | C | | | | | | | |
| MPP 13-14 | 1211 | A | A | | | | | | |
| | 1212 | A | A | | | | | | |
| | 1213 | A | A | | | | | | |
| MPP 14-15 | 1221 | B | B | | | | | | |
| | 1222 | A | A | | | | | | |
| | 1223 | B | R | | | | | | |

I-64 SHERMAN MINTON (I-64-103-4961B)


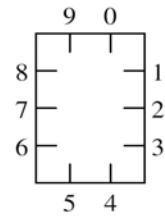
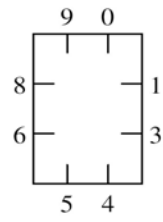
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|---------------------------------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | | | | | | | WELD CRACK LEGEND A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication ■ - Testing Not Performed | |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | |  Middle Panel Point (MPP) |  Odd Panel Point (PP) |
| PP 15 | 1234 | A | NRI | | | | | | |
| | 1239 | A | A | | | | | | |
| | 1230 | C | C | | | | | | |
| MPP 15-16 | 1241 | B | NRI | | | | | | |
| | 1242 | B | B | | | | | | |
| MPP 16-17 | 1252 | NRI | A | | | | | | |
| | 1258 | A | A | | | | | | |
| PP 17 | 1261 | A | A | | | | | | |
| | 1263 | B | R | | | | | | |
| | 1264 | B | NRI | | | | | | |
| MPP 17-18 | 1271 | A | A | | | | | | |
| | 1272 | F | F | | | | | | |
| | 1278 | A | A | | | | | | |
| MPP 18-19 | 1284 | NRI | NRI | | | | | 2007: Possible crack; verification by testing required. | |
| | 1286 | A | A | | | | | | |
| PP 19 | 1293 | F | NRI | | | | | | |
| | 1294 | NRI | NRI | | | | | 2007: Possible crack; verification by testing required. | |
| | 1296 | B | R | | | | | | |
| MPP 19-20 | 1303 | B | R | | | | | | |
| MPP 20-21 | 1311 | A | NRI | | | | | | |
| | 1313 | A | A | | | | | | |
| PP 21 | 1323 | ? | R | | | | | | |
| | 1326 | ? | R | | | | | | |
| | 1328 | F | R | | | | | | |
| | 1329 | C | C | | | | | | |
| | 1320 | C | C | | | | | | |
| MPP 21-22 | 1331 | A | A | | | | | | |
| | 1333 | A | R | | | | | | |
| SPAN 2 - SOUTH TIE CHORD | | | | | | | | | |
| MPP 0-1 | 2011 | D | D | | | | | | |
| | 2012 | B | R | | | | | | |
| | 2013 | A | A | | | | | | |
| | 2016 | E | NRI | | | | | | |
| | 2017 | E | NRI | | | | | | |

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|----------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | WELD CRACK LEGEND A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication  - Testing Not Performed | |
| | | | | | | | | | |
| PP 1 | 2021 | A | R | | | | |  Middle Panel Point (MPP) |  Odd Panel Point (PP) |
| | 2023 | A | A | | | | | | |
| | 2026 | E | E | | | | | | |
| | 2028 | A | R | | | | | | |
| | 2029 | C | C | | | | | | |
| | 2020 | A | | | | | | | |
| MPP 1-2 | 2036 | A | NRI | | | | | | |
| | 2037 | A | R | | | | | | |
| | 2038 | B | R | | | | | | |
| MPP 2-3 | 2042 | A | NRI | | | | | | |
| | 2043 | D | D | | | | | | |
| PP 3 | 2051 | NRI | R | | | | | | |
| | 2053 | A | NRI | | | | | | |
| MPP 3-4 | - | NRI | NRI | | | | | | |
| MPP 4-5 | 2071 | B | B | | | | | | |
| | 2072 | D | R | | | | | | |
| PP 5 | 2081 | B | R | | | | | | |
| | 2083 | E | NRI | | | | | | |
| | 2086 | B | NRI | | | | | | |
| | 2088 | B | NRI | | | | | | |
| | 2089 | C | NRI | | | | | | |
| MPP 5-6 | - | NRI | NRI | | | | | | |
| MPP 6-7 | 2107 | A | NRI | | | | | | |
| PP 7 | 2116 | D | NRI | | | | | | |
| | 2118 | D | R | | | | | | |
| MPP 7-8 | - | NRI | NRI | | | | | | |
| MPP 8-9 | 2136 | A | A | | | | | | |
| | 2137 | E | NRI | | | | | | |
| PP 9 | 2146 | A | NRI | | | | | | |
| | 2148 | A | NRI | | | | | | |
| | 2140 | E | NRI | | | | | | |
| MPP 9-10 | - | NRI | NRI | | | | | | |

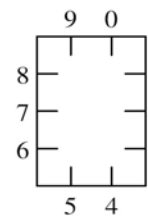
I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|-----------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | | | | | | | WELD CRACK LEGEND A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication  - Testing Not Performed | |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | |  Middle Panel Point (MPP) |  Odd Panel Point (PP) |
| MPP 10-11 | 2166 | B | R | | | | | | |
| PP 11 | 2179 | C | | | | | | | |
| MPP 11-12 | 2182 | A | NRI | | | | | | |
| | 2187 | A | NRI | | | | | | |
| MPP 12-13 | - | - | NRI | | | | | | |
| PP 13 | 2209 | C | C | | | | | | |
| MPP 13-14 | - | - | NRI | | | | | | |
| MPP 14-15 | - | - | NRI | | | | | | |
| PP 15 | 2236 | D | D | | | | | | |
| | 2238 | D | R | | | | | | |
| MPP 15-16 | 2242 | A | A | | | | | | |
| | 2243 | B | R | | | | | | |
| | 2246 | A | NRI | | | | | | |
| MPP 16-17 | 2257 | A | NRI | | | | | | |
| PP 17 | - | - | NRI | | | | | | |
| MPP 17-18 | 2271 | A | A | | | | | | |
| | 2276 | D | R | | | | | | |
| MPP 18-19 | 2284 | A | | | | | | | |
| | 2288 | E | E | | | | | | |
| PP 19 | 2293 | A | A | | | | | | |
| MPP 19-20 | - | NRI | NRI | | | | | | |
| MPP 20-21 | 2317 | A | A | | | | | | |
| PP 21 | 2313 | A | R | | | | | | |
| | 2326 | E | NRI | | | | | | |
| | 2320 | C | C | | | | | | |
| MPP 21-22 | 2332 | C | C | | | | | | |
| | 2333 | B | B | | | | | | |
| | 2334 | A | NRI | | | | | | |
| | 2337 | A | A | | | | | | |
| | 2338 | A | A | | | | | | |

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|----------|--------|------------------------------------|------|------|------|------|--|---|---|
| | | | | | | | | WELD CRACK LEGEND | |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | <div> <div> <div>9</div> <div>0</div> </div> <div> <div>8</div> <div>7</div> <div>6</div> </div> <div> <div>5</div> <div>4</div> </div> <div> <div>1</div> <div>2</div> <div>3</div> </div> </div> <p>Middle Panel Point (MPP)</p> | <div> <div>9</div> <div>0</div> </div> <div> <div>8</div> <div>6</div> </div> <div> <div>5</div> <div>4</div> </div> <div> <div>1</div> <div>3</div> </div> |

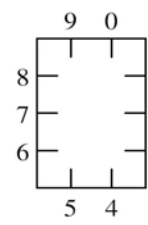
I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|--------------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | <u>WELD CRACK LEGEND</u> A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication ■ - Testing Not Performed |  <u>Middle Panel Point (MPP)</u> |
| MPP 9-10 | 3153 | A | | | NRI | | | | |
| | 3159 | F | | | NRI | | | | |
| MPP 10-11 | - | NRI | | | NRI | | | | |
| PP 11 | 3171 | NRI | | | R | | | | |
| | 3174 | E | | | E | | | | |
| | 3175 | A | | | A | | | | |
| | 3178 | NRI | | | R | | | | |
| | 3179 | C | | | R | | | | |
| | 3170 | C | | | R | | | | |
| MPP 11-12 | - | NRI | | | NRI | | | | |
| MPP 12-13 | 3196 | A | | | NRI | | | | |
| PP 13 | 3203 | A | | | A | | | | |
| | 3206 | A | | | NRI | | | | |
| | 3208 | E | | | R | | | | |
| | 3200 | D | | | D | | | | |
| MPP 13-14 | - | NRI | | | NRI | | | | |
| MPP 14-15 | 3226 | NRI | | | D | | | | |
| | 3228 | D | | | R | | | | |
| | 3220 | NRI | | | D | | | | |
| PP 15 | 3231 | NRI | | | R | | | | |
| | 3239 | NRI | | | R | | | | |
| | 3230 | C | | | R | | | | |
| MPP 15-16 | 3243 | E | | | E | | | | |
| | 3246 | D | | | R | | | | |
| MPP 16-17 | 3252 | E | | | E | | | | |
| | 3253 | A | | | A | | | | |
| | 3256 | A | | | A | | | | |
| | 3257 | E | | | R | | | | |

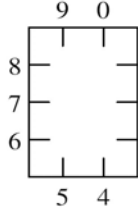
I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | | |
|--------------------------|--------|------------------------------------|------|------|------|------|--|---|--|--|
| | | | | | | | | <u>WELD CRACK LEGEND</u> A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication ■ - Testing Not Performed | | |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | | | |
| PP 17 | 3261 | C | | | R | | | | | |
| | 3263 | E | | | E | | | | | |
| | 3266 | A | | | R | | | | | |
| | 3268 | A | | | NRI | | | | | |
| | 3269 | NRI | | | R | | | | | |
| | 3260 | NRI | | | R | | | | | |
| MPP 17-18 | 3276 | A | | | R | | | | | |
| | 3278 | B | | | B | | | | | |
| MPP 18-19 | - | NRI | | | NRI | | | | | |
| PP 19 | 3291 | NRI | | | R | | | | | |
| | 3293 | C | | | C | | | | | |
| | 3296 | A | | | R | | | | | |
| | 3299 | NRI | | | R | | | | | |
| | 3290 | NRI | | | R | | | | | |
| MPP 19-20 | - | NRI | | | NRI | | | | | |
| MPP 20-21 | 3312 | B | | | R | | | | | |
| | 3313 | D | | | R | | | | | |
| | 3317 | A | | | A | | | | | |
| PP 21 | 3321 | NRI | | | R | | | | | |
| | 3325 | NRI | | | R | | | | | |
| | 3329 | C | | | R | | | | | |
| | 3320 | C | | | R | | | | | |
| MPP 21-22 | 3334 | E | | | E | | | | | |
| SPAN 2 - NORTH TIE CHORD | | | | | | | | | | |
| MPP 0-1 | - | NRI | | NRI | | | | | | |
| PP 1 | 4011 | A | | R | | | | | | |
| | 4013 | C | | C | | | | | | |
| | 4019 | A | | R | | | | | | |
| | 4010 | D | | R | | | | | | |
| MPP 1-2 | 4026 | A | | R | | | | | | |
| MPP 2-3 | 4031 | D | | R | | | | | | |
| PP 3 | 4043 | B | | R | | | | | | |

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS


| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|--------------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | <u>WELD CRACK LEGEND</u> A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication ■ - Testing Not Performed |  <u>Middle Panel Point (MPP)</u> |
| MPP 3-4 | 4051 | A | | A | | | | | |
| | 4052 | A | | A | | | | | |
| | 4053 | A | | R | | | | | |
| MPP 4-5 | 4062 | A | | A | | | | | |
| | 4063 | D | | R | | | | | |
| PP 5 | 4071 | NRI | | R | | | | | |
| | 4073 | D | | R | | | | | |
| | 4078 | NRI | | R | | | | | |
| | 4079 | C | | C | | | | | |
| | 4070 | NRI | | R | | | | | |
| MPP 5-6 | 4081 | A | | R | | | | | |
| | 4082 | E | | E | | | | | |
| | 4083 | A | | A | | | | | |
| MPP 6-7 | - | NRI | | NRI | | | | | |
| PP 7 | 4101 | B | | B | | | | | |
| | 4106 | B | | R | | | | | |
| | 4108 | A | | A | | | | | |
| MPP 7-8 | 4112 | A | | A | | | | | |
| | 4110 | A | | A | | | | | |
| MPP 8-9 | - | NRI | | NRI | | | | | |
| PP 9 | 4131 | NRI | | R | | | | | |
| | 4130 | C | | R | | | | | |
| MPP 9-10 | 4148 | B | | B | | | | | |
| MPP 10-11 | 4157 | E | | R | | | | | |
| PP 11 | - | NRI | | NRI | | | | | |
| MPP 11-12 | 4173 | C | | NRI | | | | | |
| MPP 12-13 | - | NRI | | NRI | | | | | |
| PP 13 | - | NRI | | NRI | | | | | |
| MPP 13-14 | 4208 | A | | NRI | | | | | |
| MPP 14-15 | - | NRI | | NRI | | | | | |

I-64 SHERMAN MINTON (I-64-103-4961B)
TABLE 2: DOCUMENTED LUG WELD INDICATIONS

| LOCATION | NUMBER | CONDITION (As Determined by MT) | | | | | | NOTES | |
|-----------|--------|------------------------------------|------|------|------|------|--|---|--|
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | <u>WELD CRACK LEGEND</u> A - Through center bead B - Along toe to tie chord C - Along toe to lug D - Completely fractured E - Cracked trans./diag. F - Cracked in end return NRI - No Recordable Indication ■ - Testing Not Performed |  <u>Middle Panel Point (MPP)</u> |
| PP 15 | - | NRI | | NRI | | | | | |
| MPP 15-16 | 4232 | B | | R | | | | | |
| MPP 16-17 | - | NRI | | NRI | | | | | |
| PP 17 | 4256 | A | | A | | | | | |
| | 4258 | A | | A | | | | | |
| | 4250 | C | | C | | | | | |
| MPP 17-18 | 4262 | E | | E | | | | | |
| MPP 18-19 | 4271 | A | | | | | | | |
| | 4276 | A | | | | | | | |
| | 4277 | A | | | | | | | |
| | 4278 | B | | | | | | | |
| PP 19 | 4289 | NRI | | C | | | | | |
| | 4280 | C | | C | | | | | |
| MPP 19-20 | 4291 | A | | A | | | | | |
| | 4297 | A | | NRI | | | | | |
| | 4298 | D | | D | | | | | |
| MPP 20-21 | 4302 | NRI | | B | | | | | |
| | 4307 | B | | R | | | | | |
| PP 21 | 4311 | C | | C | | | | | |
| | 4316 | E | | NRI | | | | | |
| | 4319 | C | | NRI | | | | | |
| | 4310 | D | | NRI | | | | | |
| MPP 21-22 | 4327 | A | | NRI | | | | | |


I-64 SHERMAN MINTON (I-64-103-4961B)

TABLE 3: DOCUMENTED LATERAL PLATE CONNECTION WELD INDICATIONS

| TIE-SPAN | LOCATION | NUMBER OF CRACKS | | | | | | NOTES |
|----------|-------------|------------------|------|------|------|------|--|--|
| | | | | | | | | LEGEND N - North S - South  - Testing Not Performed |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | |
| S-1 | FB5 - West | 1 | 0 | | | | | |
| S-1 | FB5 - West | 1 | 1 | | | | | |
| S-1 | FB9 - West | 2 | 2 | | | | | |
| S-1 | FB9 - East | 2 | 2 | | 2 | | | |
| S-1 | FB11 - West | 7 | 1 | | | | | 5/8" trans. indication, 9 1/8" from end near floor beam |
| S-1 | FB11 - East | 1 | 0 | | | | | |
| S-1 | FB13 - West | 0 | 1 | | | | | 3/8" transverse indication, 7 7/8" from end |
| S-1 | FB13 - East | 0 | 2 | | | | | 1/2" trans. ind. 6 1/4" from end; & full width trans. Ind |
| S-1 | FB16 - East | 0 | 0 | | 1 | | | |
| S-1 | FB17 - East | 1 | 1 | | | | | 1/2" transverse indication |
| S-1 | FB19 - East | 0 | 1 | | | | | 1/2" transverse indication |
| S-2 | FB1 - East | 2 | 2 | | | | | |
| S-2 | FB17 - West | 2 | 2 | | | | | |
| S-2 | FB17 - East | 2 | 1 | | 1 | | | |
| N-1 | FB1 - West | 4 | | 1 | | | | |
| N-1 | FB1 - East | 10 | | 9 | | | | |
| N-1 | FB5 - West | 6 | | 0 | | | | |
| N-1 | FB7 - West | 1 | | 0 | | | | |
| N-1 | FB17 - East | 7 | | | | | | |
| N-1 | FB17 - West | 13 | | | | | | |
| N-1 | FB21 - West | 17 | | | | | | |

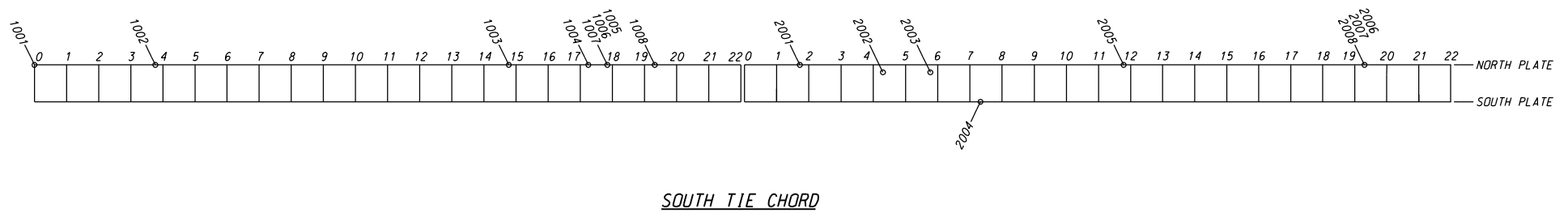
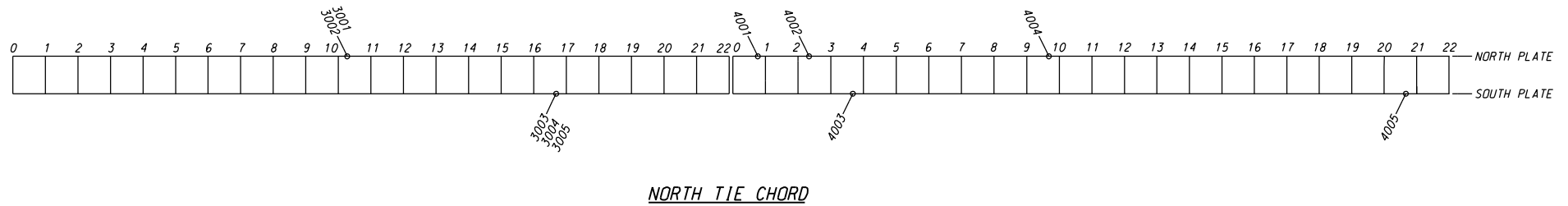
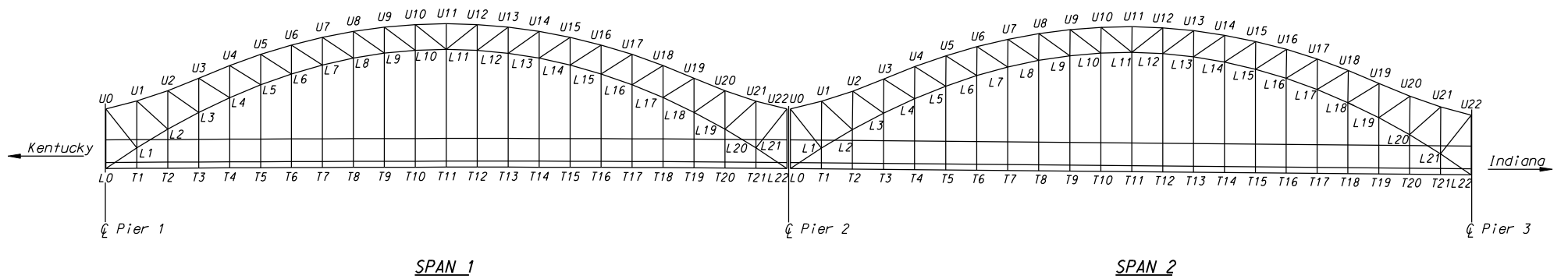
I-64 SHERMAN MINTON (I-64-103-4961B)

TABLE 3: DOCUMENTED LATERAL PLATE CONNECTION WELD INDICATIONS

| TIE-SPAN | LOCATION | NUMBER OF CRACKS | | | | | | NOTES |
|----------|-------------|------------------|------|------|------|------|--|--|
| | | | | | | | | LEGEND N - North S - South  - Testing Not Performed |
| | | 1992 | 1999 | 2004 | 2006 | 2007 | | |
| N-1 | FB21 - East | 3 | | | | | | |
| N-2 | FB11 - East | 1 | | 0 | | | | |
| N-2 | FB15 - West | | | 1 | | | | |
| N-2 | FB17 - West | 1 | | 1 | | | | |
| N-2 | FB21 - West | 3 | | 2 | | | | |
| N-2 | FB21 - East | 1 | | 0 | | | | |

APPENDIX C

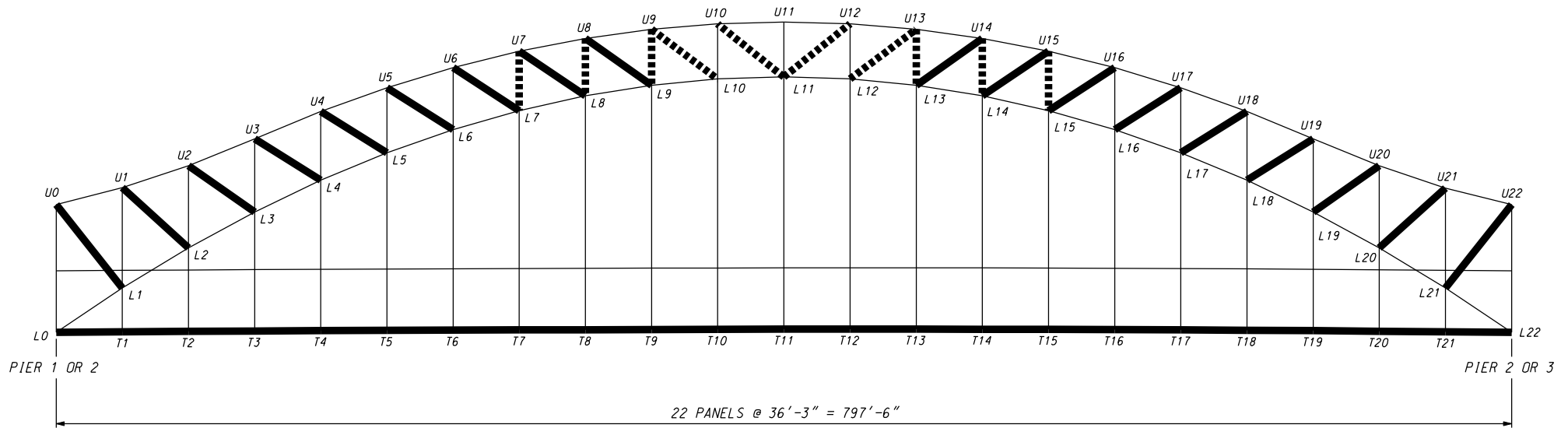
2007 BUTT WELD INDICATION DIAGRAM



2007 NDT & VISUAL INSPECTION
LOCATIONS OF RECORDED BUTT WELD CRACK INDICATIONS

APPENDIX D

FRACTURE CRITICAL MEMBER DIAGRAM (MAIN TRUSS SPANS)



LEGEND

- FRACTURE CRITICAL MEMBER
- FRACTURE CRITICAL STRESS REVERSAL MEMBER
- NON FRACTURE CRITICAL MEMBER

FRACTURE CRITICAL MEMBERS (FCM)
TENSION AND STRESS REVERSAL MEMBERS - TIED ARCH SPANS

APPENDIX E

FUTURE INSPECTION PLAN

FUTURE INSPECTION PLAN

SHERMAN MINTON BRIDGE I-64 OVER THE OHIO RIVER AT NEW ALBANY, INDIANA FLOYD COUNTY BRIDGE NO. I-64-103-4961B

INTRODUCTION

The following consultant inspection plan is provided for the Sherman Minton Bridge. The inspections covered by this plan are in addition to the joint Bi-State Annual Walkover Inspection and any other annual inspections performed by INDOT personnel.

The plan assumes a consultant will inspect the bridge every two (2) years in the future. The level of effort for each inspection is similar; however, some years may require additional personnel or equipment use. Please note that the inspection plan does not include underwater inspections or any non-destructive testing in the main spans.

The inspection plan divides areas of the bridge into two categories: (1) those required to be inspected on a two-year cycle, and (2) all other inspection or testing areas. These categories and their descriptions are provided in the next two sections; Two-Year Inspection Cycle and Additional Inspection Areas.

In addition to the required areas of the bridge to be inspected during the two-year inspection, INDOT will designate any additional inspection or testing areas to be performed. These will be decided based on need or the condition of the structure. Based on the findings from the two-year inspections, future full in-depth inspection(s) may be required.

Every butt weld in all four segments of the fracture critical welded steel box tie chords should be retested during the next two year cycle. This includes only the butt welds accessible by climbing on the tie chord. Butt welds such as the bottom of the bottom plate, and the bottom 6" of the exterior vertical plates, considered "inaccessible", should be tested on a 10-year basis.

A chart is provided in this Appendix to log inspection history, beginning with the 1992 in-depth inspection performed by Hazelet + Erdal, Inc (now URS). General guidelines for traffic control, equipment, and report requirements for future inspections are also provided.

TWO-YEAR INSPECTION CYCLE

The following areas of the bridge are required to be inspected during each two-year inspection. This list may be altered in the future.

Fracture Critical Tied-Arch Members (Spans 1 and 2)

Arms length visual inspection of all fracture critical members in the truss arch. Cursory inspection of stringers, joints, deck, bearings, substructure, and navigational lighting.

Tie Chord Butt Welds

Non-Destructive Testing on butt welds at locations specified by INDOT. This includes all accessible butt welds in the specified areas without the use of specialized equipment. This consists of magnetic particle (MT) and ultrasonic (UT) were necessary to verify significant finds.

Fracture Critical Members in Through-Deck Truss (Spans A thru C)

Arms length visual inspection of all fracture critical members in the through-deck truss spans. Cursory inspection of stringers, joints, bearings, substructure, and deck.

ADDITIONAL INSPECTION AREAS

TIED ARCH SPANS 1 & 2

South Tie Chord

Non-Destructive Testing consisting of magnetic particle (MT) and ultrasonic (UT) are necessary to verify significant finds. Testing of all butt welds, lug welds, lateral connection plate welds, and miscellaneous welds accessible without requiring special equipment. (Note – 1992 inspection did NOT include all butt welds and lateral connection plate welds)

North Tie Chord

Non-Destructive Testing consisting of magnetic particle (MT) and ultrasonic (UT) are necessary to verify significant finds. Testing of all butt welds, lug welds, lateral connection plate welds, and miscellaneous welds accessible without requiring specialized equipment. (Note – 1992 inspection did NOT include all butt welds and lateral connection plate welds)

Inaccessible Butt Welds

Non-Destructive Testing on all butt welds accessible only by using a snooperscope. This consists of magnetic particle (MT) and ultrasonic (UT) were necessary to verify significant finds.

Truss Arch and Suspender Cables

Arms-length visual inspection of entire arch truss above the upper deck, including the suspender cables.

Top Deck Floor System

Arms-length visual inspection of floorbeams, stringers, and underside of the top deck.

Bottom Deck Floor System

Arms-length visual inspection of floorbeams, stringers, bottom of lower chords, underside of deck, and lower lateral bracing with snoopers. Inspection of substructure units using binoculars from snoopers and at waterline.

THROUGH-DECK TRUSS SPANS A THRU C

Superstructure

Arms-length visual inspection of all lower chords, upper chords, verticals diagonals, floorbeams and stringers in the through-deck truss. cursory inspection of substructure units.

MULTI-GIRDER SPANS D THRU M

Superstructure

Arms-length visual inspection of all lower chords, upper chords, verticals diagonals, floorbeams and stringers in the through-deck truss. cursory inspection of substructure units.

DECK AND RAILING

Deck, Railing, and Lighting

Cursory inspection of the topside of the deck, the curbs, barriers, railing, signage, approaches, and roadway lighting.

TRAFFIC CONTROL

The I-64 Sherman Minton Bridge is a six-lane double deck bridge. The lower deck carries eastbound I-64 from New Albany, IN to Louisville, KY; and the upper deck carries westbound I-64 from Louisville, KY to New Albany, IN. For equipment use and the safety of the inspectors, it is necessary to close one-lane of traffic. Lane closures shall be in accordance with INDOT Standard Drawing No. E 801-TCLC-05, *Daytime Lane Closures, Right Lane Closed* or E 801-TCLC-06, *Daytime Lane Closures, Left or Center Lane Closed*. During the 2007 inspection,

lane closures in the eastbound lanes were not allowed until after 9:00 A.M and lane closures in the westbound lanes were not allowed after 3:00 P.M.

EQUIPMENT REQUIREMENTS

No specialized equipment is required for the two year inspection of the lower tie chords not including the inaccessible areas. A Mark V Snooper, platform truck or equivalent is required when inspection of the inaccessible welds are to be included. The lower tie chords are easily accessible from the deck, especially by using the specially made ladder for the Sherman Minton Bridge. The ladder can be obtained by contacting the INDOT Falls City Sub District (812-282-7493). During this inspection, the ladder was located at the New Albany Maintenance Garage.

During future inspections, a range of specialized equipment may be required. Depending on the type of inspection, this could range from a 40-foot lift to inspect the floorbeam frames to a 135-foot aerial boom lift to inspect the arches.

RECOMMENDED PROCEDURES FOR NEW AND ACTIVE CRACK INDICATIONS

This section is intended to provide guidance for future inspections when new crack indications are found or have grown substantially. As with any other significant findings, the consultant shall notify INDOT as soon as possible. Rather than taking immediate action, it is generally preferred to leave the indication(s) in place until all options can be formally discussed at the post-inspection meeting. This allows for proper planning and execution of monitoring or repair(s).

If the indication is not threatening the integrity of the structure, consideration should be given to leaving it in place for monitoring. Monitoring will allow for evaluation of any growth patterns and to determine possible causes of cracks in this bridge.

If the indication appears to be actively growing or threatening the integrity of the structure, consideration may be given to repair or removal. With consensus of INDOT Central Office and the consultant, a method to remove the crack indication may be developed and executed concurrently with the inspection. This allows for immediate removal of the indication and the ability to perform subsequent non-destructive testing to verify the indication has been completely removed.

A bridge engineer should evaluate the impact of any repair scheme on the tie chord. This could require detailed analyses or calculations. Typical repairs may include grinding out the crack indication, drilling crack arrestor holes, and/or placing a bolted plate over the affected area.

| I-64 Sherman Minton Bridge over the Ohio River | | | | | | Consultant Inspection Log | | | | |
|--|------|------|------|------|------|---------------------------|--|--|--|--|
| | 1992 | 1999 | 2004 | 2006 | 2007 | | | | | |
| TIED ARCH SPANS 1-2 | | | | | | | | | | |
| Fracture Critical Tied-Arch Members* | | | | | | | | | | |
| NDT North Tie Chord Butt Welds, Span 1 | | | | | | | | | | |
| NDT North Tie Chord Butt Welds, Span 2 | | | | | | | | | | |
| NDT South Tie Chord Butt Welds, Span 1 | | | | | | | | | | |
| NDT South Tie Chord Butt Welds, Span 2 | | | | | | | | | | |
| NDT North Tie Chord, Span 1 | | | | | | | | | | |
| NDT North Tie Chord, Span 2 | | | | | | | | | | |
| NDT South Tie Chord, Span 1 | | | | | | | | | | |
| NDT South Tie Chord, Span 2 | | | | | | | | | | |
| Inaccessible Butt Welds | | | | | | | | | | |
| Truss Arch and Suspender Cables* | | | | | | | | | | |
| Top Deck Floor System | | | | | | | | | | |
| Bottom Deck Floor System | | | | | | | | | | |
| ADDITIONAL INSPECTION AREAS | | | | | | | | | | |
| Through Deck Truss Spans A-C | | | | | | | | | | |
| Multi-Girders Spans D-M | | | | | | | | | | |
| Deck and Railing | | | | | | | | | | |

* See past inspection reports for scope of each inspection